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# Status of Moog SureFly Hover Test and Progress on Noise Prediction Efforts

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# Overview of SureFly Measurements

- Ground run-up: November 2019, NASA/TM-20210015042
- Electric motor noise measurements: August 2021
- 15-foot hover test: June 2022
- Anticipated full hover test: August 2023
- Sterna rotor procured: February 2023



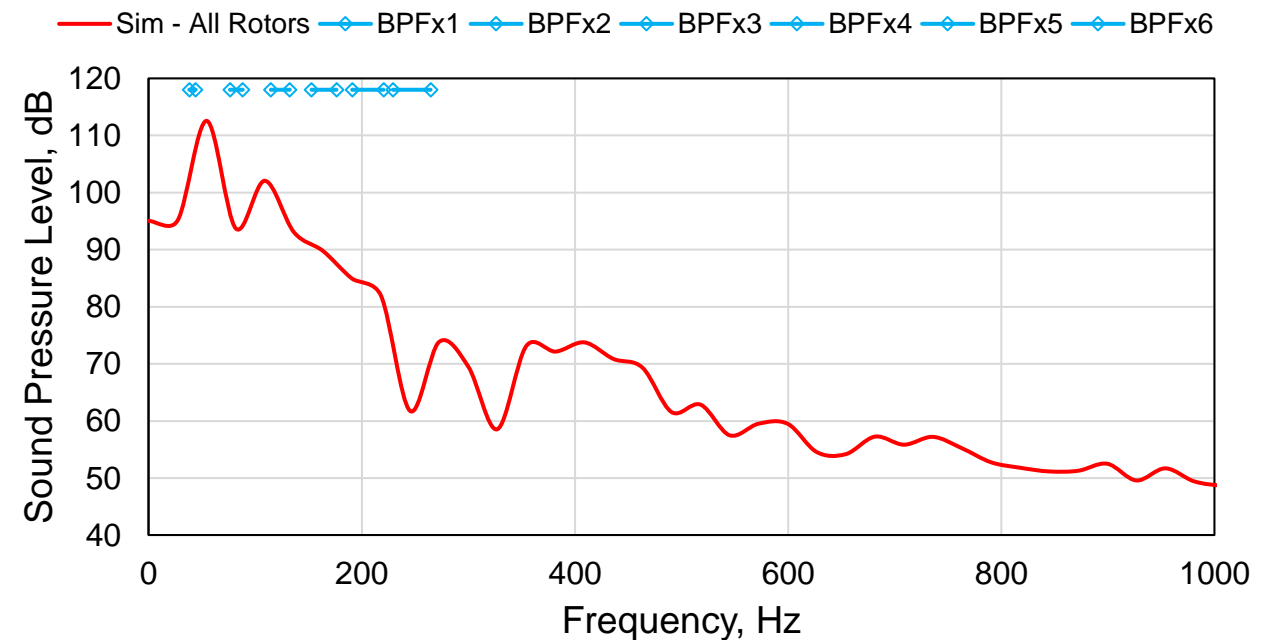
# Progress on Hover Tests

- 2022 hover test
  - Working with precise vehicle positioning, planned GPS coordination test week of March 12<sup>th</sup>
  - Vehicle data
- 2023 hover test
  - SureFly testing moved to the Springfield airport: February 2023
  - Springfield allows for flight well above 15 feet
  - NASA's hover test at various altitudes are anticipated to begin second half of 2023
  - Higher altitudes allow for acoustic measurements out of ground effect
  - Currently working with Moog on precise vehicle positioning



# Noise Predictions

- CAMRADII coupled with AARON/ANOPP2 via pyaaron
  - Model of SureFly includes all 8 rotors
  - RPM controlled, so rotor tip speed is specified as input
  - Free wake
- Assumptions
  - No droop or sweep included in the model
  - NACA0012 airfoil tables used in place of custom tables
  - Rigid blade assumption
- Future predictions
  - Custom airfoil tables will be developed
  - Update droop and sweep from measurements
  - Update blade rigidity





# Sterna Blade Topology

- Sterna 92" diameter rotor
  - Procured Sterna blade for the purpose of scanning and obtaining surface coordinates
  - Sterna has granted permission to release NASA's measured coordinates publicly
  - Structural analysis tests to get bulk properties are planned



- Two blades, connecting hub, and Emrax 268 motor (used on SureFly) are available for future testing

# Status of Sterna Blade Scanning

- 3D scanning requirements and best practices meeting with Ames, Glenn, and Langley personnel: February 8<sup>th</sup>, 2023
- Preliminary mid resolution scan: February 9<sup>th</sup>, 2023
  - Quantum Max FaroArm used for scanning
  - Initial scan included ~250k points
  - Concern of inadequate resolution along the trailing edge at some cross-sectional stations
- High resolution scan: March 2023
  - >1 million points anticipated
  - Working to get data in a useable file format



# Conclusions

- SureFly has transitioned testing to the Springfield airport, allowing for development at higher altitudes
- NASA acoustic measurements at higher altitudes are anticipated for the second half of 2023
- CAMRADII model has been developed
- Sterna blade topology scanning at high resolution is underway
- We are actively seeking measurement opportunities





# Questions/Suggestions/Comments/Concerns??



## Thank you for your attention!